RZ/G2L Group Board Support Package
Version 1.4
Release Note

R01US0471EJ0108
Rev. 1.08
Mar 18, 2022

Introduction

This release note describes the contents, building procedures and important points of the RZ/G2L Group Board Support Package (hereinafter referred to as “BSP”).

This release note is the update of “RZ/G2L Board Support Package Version 1.4 Release Note (Document Number: R01US0471EJ0107)”. Please confirm Enable GPU in the page 5 to check the update points.

Contents

1. Release Items

- **Name and version**
  RZ/G2L Group Board Support Package
  Version 1.4 (hereinafter referred to as “BSP v1.4”)

- **Distribution method**
  Please visit the site below and create an account to download the packages. Basic packages of BSP v1.4 which are listed in **Table 1** can be downloaded.

  RZ/G2L product page:
  https:/www.renesas.com/RZG2L

  RZ/G2LC product page:
  https:/www.renesas.com/RZG2LC

  RZ/G2UL product page:
  https:/www.renesas.com/RZG2UL

  RZ/G2L Group Board Support Package:
  https://www.renesas.com/products/microcontrollers-microprocessors/rz-arm-based-high-end-32-64-bit-mpus/rzg2l-board-support-package-419-cip

- **Target boards**
  RZ/G2L Evaluation Board Kit PMIC version (*1):
  - RZ/G2L SMARC Module Board v2.1
  - RZ SMARC Series Carrier Board v4.0

  RZ/G2LC Evaluation Board Kit (*2):
  - RZ/G2LC SMARC Module Board v1.0
  - RZ SMARC Series Carrier Board v4.0

  RZ/G2UL Evaluation Board Kit (*3):
  - RZ/G2UL SMARC Module Board v1.0
  - RZ SMARC Series Carrier Board v4.0

(*1) “RZ/G2L Evaluation Board Kit” and “RZG2L Evaluation Board Kit PMIC version” includes the RZ/G2L SMARC Module Board and the RZ SMARC Series Carrier Board.
(*2) “RZG2LC Evaluation Board Kit” includes the RZ/G2LC SMARC Module Board and the RZ SMARC Series Carrier Board. This board is supported in this release, but it is preliminary and provided AS IS with no warranty. In next release, this board is going to be supported officially and verified.
(*3) “RZ/G2UL Evaluation board Kit” includes the RZ/G2UL SMARC Module Board and the RZ SMARC Series Carrier Board.
The “Evaluation board Kit for RZ/G2UL MPU” will be called “RZ/G2UL Evaluation Kit” in the next section.

- **Functions**
  Linux BSP
  - Linux Kernel
  - Device Drivers

- **File contents**
  BSP v1.4-update1 is delivered by the files listed in **Table 1**.

Table 1. RZ/G2L Board Support Package
Basic packages

File	Description
RTK0EF0045Z0019AZJ-v1.4.zip	RZ/G2L Group Board Support Package. This file includes the **Yocto recipe packages** and the necessary documents.
rzg2l_bsp_v1.4.tar.gz	**Yocto recipe packages**.
r01us0471ej0108-rz-g.pdf	This document
r01us0472ej0104-rz-g.pdf	Component list
r01tu0338ej0105-rz-g.pdf	Documents describing booting method and the required settings of bootloader
RTK0EF0045Z13001ZJ-v0.81_JP.zip RTK0EF0045Z13001ZJ-v0.81_EN.zip	RZ/G2L Mali Graphic Library Evaluation Version V0.81. This is the graphic package which corresponds to BSP v1.4.
RTK0EF0045Z15001ZJ-v0.55_JP.zip RTK0EF0045Z15001ZJ-v0.55_EN.zip	RZ/G2L Codec Library Evaluation. This is the codec package which corresponds to BSP v1.4.

The BSP is provided “AS IS” with no warranty and the license which is described in the source code. Please check the contents of the license carefully.

2. Build environment

The environment for building the BSP is listed in **Table 2**. Please refer to "RZ/G2L and RZ/G2LC SMARC EVK Start-up Guide" for details about setting up the environment.

A Linux PC is required for building the software.

A Windows PC can be used as the serial terminal interface with software such as TeraTerm.

Table 2. Equipment and Software Necessary for Developing Environments of RZ/G2L Linux Platform

Equipment		Description
Linux Host PC		Used as build/debug environment
	OS	Ubuntu 20.04 LTS (recommended) 64 bit OS must be used.
	NFS server	(Optional) Used for mounting rootfs via NFS
Windows Host PC		Used for controlling the board with terminal software
	OS	Windows 10
	Terminal software	Used for controling serial console of the target board Tera Term (latest version) is recommended Available at https://ttssh2.osdn.jp/index.html.en
	VCP Driver	Virtual COM Port driver which enables to communicate Windows Host PC and the target board via USB which is virtually used as serial port. Available at: ● http://www.ftdichip.com/Drivers/VCP.htm

3. BSP Build Instructions

3.1 Building images to run on the board

This section describes how to build the BSP. Before starting the build, run the command below on the Linux Host PC to install the packages used for building the BSP.

```
$ sudo apt-get update
$ sudo apt-get install gawk wget git-core diffstat unzip texinfo gcc-multilib \
build-essential chrpath socat cpio python3 python3-pip python3-pexpect xz-utils \
debianutils iputils-ping python3-git python3-jinja2 libegl1-mesa libsdl1.2-dev \
pylint3 xterm
```

Please refer to the URL below for detailed information:

- https://docs.yoctoproject.org/3.1.5/brief-yoctoprojectqs/brief-yoctoprojectqs.html

Run the commands below and set the username and email address before starting the build procedure. ⚠ **Without this setting, an error occurs when the building procedure runs git commands to apply patch files.**

```
$ git config --global user.email "you@example.com"
$ git config --global user.name "Your Name"
```

(1) Create a working directory (rzg2l_bsp_v1.4) in your home directory, and decompress the Yocto recipe package

Run the commands below. Copy the compressed Yocto recipe package file (rzg2l_bsp_v1.4.tar.gz) into your home directory prior to this step.

```
$ mkdir ~/rzg2l_bsp_v1.4
$ cd ~/rzg2l_bsp_v1.4
$ tar zxvf ~/rzg2l_bsp_v1.4.tar.gz
```

⚠ Note) If you have a board with the early silicon version, please refer to the Section 6 Notes - (1) and apply the patch files during this step. Please also confirm how to check which version you use.

(2) Enable GPU and Video Codec

The BSP can build the 2 types of the images: core-image-weston and core-image-minimal.

If you enable the GPU on RZ/G2L and RZ/G2LC with **core-image-weston**, please copy the Graphic package (RTK0EF0045Z13001ZJ-v0.81_EN.zip or RTK0EF0045Z13001ZJ-v0.81_JP.zip) to working directory and run the commands below. If you build core-image-minimal, please ignore this step.

```
$ cd ~/rzg2l_bsp_v1.4
$ unzip RTK0EF0045Z13001ZJ-v0.81_EN.zip
$ tar zxvf RTK0EF0045Z13001ZJ-v0.81_EN/meta-rz-features.tar.gz
$ cd ~/ rzg2l_bsp_v1.4/poky
$ git cherry-pick e256885889fdea215be100f204277f675f7b5c2d
```

If you enable the video codec on RZ/G2L with **core-image-weston** or **core-image-minimal**, please copy the video codec package (RTK0EF0045Z15001ZJ-v0.55_EN.zip or RTK0EF0045Z15001ZJ-v0.55_JP.zip) to working directory and run the commands below.

```
$ cd ~/rzg2l_bsp_v1.4
$ unzip RTK0EF0045Z15001ZJ-v0.55_EN.zip
$ tar zxvf RTK0EF0045Z15001ZJ-v0.55_EN/meta-rz-features.tar.gz
```

Note) The Graphic package and the video codec package are under development. These are released ASIS with no warranty.

(3) Setup a build environment

Run the commands below. The environment to build is set by the source command.

```
$ cd ~/rzg2l_bsp_v1.4
$ source poky/oe-init-build-env
```

(4) Prepare the default configuration files for the target board

Run the commands below. Please replace "*board*" by the name below:

RZ/G2L Evaluation Board Kit:	smarc-rzg2l
RZ/G2L Evaluation Board Kit PMIC version:	smarc-rzg2l
RZ/G2LC Evaluation Board Kit:	smarc-rzg2lc
RZ/G2UL Evaluation Board Kit:	smarc-rzg2ul

```
$ cd ~/rzg2l_bsp_v1.4/build
$ cp ../meta-rzg2/docs/template/conf/board/*.conf ./conf/
```

Note) By default, **GPLv3 packages** are not permitted to be included in the BSP build. If you want to use GPLv3 packages in your system, please refer to the Section 6 Notes - (2).

(5) Start a build

Run the commands below to start a build. The Linux Host PC requires an internet connection when building. Building an image can take up to a few hours depending on the user's host system performance and internet speed. The BSP can build the 2 types of images like below. Please refer to the "Component list" for details about components of each images.

```
$ bitbake core-image-minimal
```

Or

```
$ bitbake core-image-weston
```

After the build is successfully completed, a similar output will be seen, and the command prompt will return.

```
NOTE: Tasks Summary: Attempted 7427 tasks of which 16 didn't need to be rerun and al
l succeeded.
```

All necessary files listed in **Table 3** will be generated by the bitbake command and will be in the **`build/tmp/deploy/images`** directory.

Please choose the correct files for your board using the table below.

Table 3. Image files

RZ/G2L	**Linux kernel**	Image-smarc-rzg2l.bin
	Device tree file	r9a07g044l2-smarc.dtb
	root filesystem	<*image name*>-smarc-rzg2l.tar.bz2
	Boot loader	・bl2_bp-smarc-rzg2l.srec ・fip-smarc-rzg2l.srec
	Flash Writer	Flash_Writer_SCIF_RZG2L_SMARC_DDR4_2GB.mot
RZ/G2L PMIC ver	**Linux kernel**	Image-smarc-rzg2l.bin
	Device tree file	r9a07g044l2-smarc.dtb
	root filesystem	<*image name*>-smarc-rzg2l.tar.bz2
	Boot loader	・bl2_bp-smarc-rzg2l_pmic.srec ・fip-smarc-rzg2l_pmic.srec
	Flash Writer	Flash_Writer_SCIF_RZG2L_SMARC_PMIC_DDR4_2GB_1PCS.mot
RZ/G2LC	**Linux kernel**	Image-smarc-rzg2lc.bin
	Device tree file	r9a07g044c2-smarc.dtb
	root filesystem	<*image name*>-smarc-rzg2lc.tar.bz2
	Boot loader	・bl2_bp-smarc-rzg2lc.srec ・**fip-smarc-rzg2lc.srec**
	Flash Writer	・Flash_Writer_SCIF_RZG2LC_SMARC_DDR4_1GB_1PCS.mot
RZ/G2UL	**Linux kernel**	Image-smarc-rzg2ul.bin
	Device tree file	r9a07g043u11-smarc.dtb
	root filesystem	<*image name*>-smarc-rzg2ul.tar.bz2
	Boot loader	・bl2_bp-smarc-rzg2ul.srec ・fip-smarc-rzg2ul.srec
	Flash Writer	・Flash_Writer_SCIF_RZG2UL_SMARC_DDR4_1GB_1PCS.mot

<*image name*> will be the name used in the step (5).

For the booting method and the required settings, please refer to the “RZ/G2L Group and RZ/V2L SMARC EVK Start-up Guide”.

3.2 Building SDK

To build Software Development Kit (SDK), run the commands below after completing the steps in the section **3.1**.

The SDK allows you to build custom applications outside of the Yocto environment, even on a completely different PC. The commands below will generate an SDK installer that can be used to install the SDK.

Note) The SDK build is a limitation in this release because the build may fail depending on the build environment. Renesas is investigating this issue.

For building the SDK installer:

```
$ cd ~/rzg2l_bsp_v1.4/build
$ bitbake <image name> -c populate_sdk
```

<image name> will be “core-image-minimal” or “core-image-weston”. Please select the image name which you used in the step (5) of the section 3.1.

The resulting SDK installer will be in **build/tmp/deploy/sdk/**

The SDK installer will have the extension .sh
To run the installer execute the following command:

```
$ sudo sh poky-glibc-x86_64-core-image-weston-aarch64-smarc-rzg2l-toolchain-\
3.1.5.sh
```

4. Components

The components which are commonly used in this release are listed in Table 4. Please also refer to the “Component list” for details.

Table 4. Versions of commonly used components

Components	BSP v1.1	BSP v1.3-update2	BSP v1.4
Linux kernel	4.19.140-cip33	4.19.140-cip41	4.19.140-cip54
GCC	8.3.0 (Arm GCC 8.3-2019.03)	8.3.0 (Arm GCC 8.3-2019.03)	8.3.0 (Arm GCC 8.3-2019.03)
glibc	2.28	2.28	2.28
busybox	1.31.1	1.31.1	1.31.1
openssl	1.1.1d	1.1.1d	1.1.1d

5. Restrictions

(1) Driver

In this release the below drivers can be used but are not fully tested:

- CPG
- GPIO
- MIPI DSI
- Interrupt Controller
- Direct Memory Access Controller
- MTU3a
- GTM
- WDT
- SPI
- SPI Multi I/O Bus Controller
- I²C
- A/D Converter
- USB
- LCDC

(2) Building SDK

The SDK build is a limitation in this release.

6. Notes

(1) Early version of RZ/G2L Evaluation Board Kit

When you use the **early** version of the RZ/G2L LSI, please run the commands below to apply the patch files after step (1) in the section 3.1.

```
$ cd ~/rzg2l_bsp_v1.4/meta-rzg2
$ patch -p1 < ../extra/0001-trusted-firmware-a-add-rd-wr-64-bit-reg-workaround\
.patch
$ patch -p1 < ../extra/0002-linux-renesas-add-workaround-patch-for-gicv3.patch
```

Note) If you want to know which version of the RZ/G2L LSI you use, please check the LSI on the board. When "2050KC002" is printed on the LSI, you use the early version.

(2) GPLv3 packages

In this release, the GPLv3 packages are disabled as default in *build/conf/local.conf*:

```
INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

If you want to use GPLv3, just hide this line:

```
#INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

(3) Disable libraries of GPU and video codec

When you want to disable the functions of the video codec, please add lines in *build/conf/local.conf*:

- Disable OpenGL ES library in the graphics package (*1)

```
USE_RENESAS_GLES = "0"
```

- Disable OpenCL library in the graphics package (*1)

```
USE_RENESAS_OPENCL = "0"
```

- Disable OpenMAX library for decode in the video codec package (*2)

```
USE_CODEC_DEC = "0"
```

- Disable OpenMAX library for encode in the video codec package (*2)

```
USE_CODEC_ENC = "0"
```

(*1) This library is included in RTK0EF0045Z13001ZJ-v0.81_EN.zip and RTK0EF0045Z13001ZJ-v0.81_JP.zip
(*2) This library is included in RTK0EF0045Z15001ZJ-v0.55_EN.zip and RTK0EF0045Z15001ZJ-v0.55_JP.zip

(4) Docker

When you want to enable the function of Docker, please run the commands below and add a line in *build/conf/local.conf*.

```
$ cd ~/rzg2l_bsp_v1.4
$ git clone https://git.yoctoproject.org/git/meta-virtualization -b dunfell
$ cd meta-virtualization
$ git checkout 9e9868ef3d6e5da7f0ecd0680fcd69324593842b
```

Add a line in *build/conf/local.conf*:

```
DOCKER_ENABLE = "1"
```

Website and Support

Renesas Electronics Website
http://www.renesas.com/

Inquiries
http://www.renesas.com/contact/

REVISION HISTORY		RZ/G2L Group Board Support Package	
Rev.	Date	Discription	
		page	Summery
1.07	Feb 28, 2022	–	First Edition issued
1.08	Mar 18, 2022	5	Add Enable GPU process